

February 24, 2018

~ PROJECT ARTEMIS

ARTEMIS, daughter of Zeus and Leto, Hellenic goddess of the hunt. Sister to Apollo.

"As I take man's last step from the surface, back home for some time to come - but we believe not too long into the future - I'd like to just [say] what I believe history will record. That America's challenge of today has forged man's destiny of tomorrow. And, as we leave the Moon at Taurus-Littrow, we leave as we came and, God willing, as we shall return, with peace and hope for all mankind. 'Godspeed the crew of Apollo 17'"
~ Apollo 17 Commander Gene Cernan, upon leaving the Lunar surface, Dec 14, 1972. 45 years ago.

... In which I propose a course of action for President Trump and NASA similar to what has been planned, to become a suddenly-announced fiat in the tradition of John F. Kennedy.

- "We shall return to the surface of the Moon."
- "It will happen before the end of my second term in office."
- "The mission will be ceremoniously designated 'Apollo 18' "
- "The next footprint on the Moon taken by a member of Apollo 18's all-female crew."
- ~ "It's their turn."
- ~ "In this age, planetary defense shall be 'space job one'."

As Commander to NASA, *the President could do this.*

He might be the last President able to leverage it into national catharsis.

If a woman steps onto the Moon in the company of men, *this opportunity is lost.*

At 5 years I witnessed the first footprint on the Moon. As father to a daughter I would find it difficult to explain the exclusive 'maleness' of the Apollo missions. I have never been asked, which is saddest of all.

Women absent from Apollo, what cost? Can it even be measured?

As with any redress of the past we may simply announce that a problem has been corrected, a reasonable *meritocracy* has been imposed where there had been *bias* or *injustice*. Inclusive culture is happening now, but the integration of women has never been heralded by any achievement that could compare with a female footprint on the Moon. The bias of Apollo (despite women in training) has been discussed at length, but what could *end* that discussion? Demonstrate that an era of male dominance in space has ended?

A recent NASA announcement that a woman *might* be the one to step off onto the lunar surface first, is the perfect lead balloon, kind of tone-deaf. NASA must strive for equanimity in all things, even refrain from stating this as flat-fact. Perhaps some at NASA would secretly cheer if the President did *pull rank*.

~ WHY 'APOLLO 18'?

Apollo 18 was the name of a forgettable movie. It would be sufficient reason to create an Apollo mission to help it be forgotten further.

- Apollo 'back in business' draws on the excitement of the era.
- Opening with an all-woman crew to land on the Moon gives needed 'closure' for Apollo.
- History should describe it as a symbolic act of atonement that ushers in a gender-blind future.
- Sick cultures need grandiose gestures to heal properly. Only the sickest do not realize this.

~ CUE THE 'NEW' SPACE RACE

A woman's footprint on the Moon is *inevitable* and will be universally seen as a positive milestone. It will gather more interest than our modern era would dare admit. But if it is a citizen of any other country, expect more than a smiling wink. Expect from world press, even factions within the country whose actions run counter to its well being, a sustained barrage detailing Apollo era 'excesses'. Of which, the only true one, an excess of men. There is a tangible prize to be taken here that is even more valuable now than it might have been during Apollo. For the United States was held in high esteem during its Apollo moments, even by its enemies. Today whether it's EU posturing or UN power plays or opposition campaign tactics or Nested Russian Hacker Dolls, it has become fashionable to *dis* the USA. When such an opportunity presents, with more verve than even the *thing* being reported.

Any entity (besides NASA) who plants a woman on the Moon would impart its own flavor in drawn out comparisons with NASA, at NASA's expense, and the USA also. Even from within. We may like the idea of private space exploration, and it is on the way... but if a corporation lands women first the press will never leave it at that, there will be pointless and trite insinuation that Apollo could have been done a better way, detracting from NASA's greatness and the *importance* of re-starting human expansion into space.

If China does it first no one will be the least bit surprised. It's *that* bad.

China would even be gentle and smugly polite about its achievement. It's *that* bad.

Once the milestone takes hold in the public imagination it may rope in half the human race to various degrees, and you know the half of which I speak. This cannot be fathomed by pre-polling or focus group, it will manifest as a slowly unfolding realization that they are *looking forward to something*. We have seen the aggregate effect passing desires of teenagers have on economy and politics. What amplification effect might be observed once *women* (in secret) begin to become enamored with the idea, root for it in concert... with a mission that is presented to them as a 'slam-dunk win' and not some 'happens-when-it-happens'?

The declaration of an *all-female crew* is more profound, and psychologically more powerful by an order of magnitude, than the simple idea of a woman doing any such thing. There are different circuits in play related to herd identity. It is the difference between "Good for her" and "Go team!"

The problem with the Moon orbit in 2018 was time too dear. Before 2024 is more reasonable, and it is conceivable we might land there with a *big push*. If we commit to a timeline we'd best be prepared to make bold strides to the finish. Others may join the race, but winning would also go a long way toward convincing America's better half that it is Great Again.

~ CUE THE NASA PUSHBACK

NASA will totally object. They must. Their objection should be expected, noted... orchestrated where possible, as meticulously as any procedure in space. There does exist today an inclusive culture that (if you ask anyone) was hard-won even if it wasn't, is balanced on a knife-edge even if it isn't. A Presidential directive affecting crew selection is unprecedented in history even if it isn't. NASA serves at the pleasure of the President, who must pretend that he does not enjoy upsetting the 'order of things'. Even if he does.

To any males passed over for that mission -- a personal appeal as heartfelt as a condolence, as earnest as an order given for any military mission. I believe a crucial interest of National Security would be served by

Project Artemis, if it helps to unify the country in the direction of space with any measure of the Apollo years. And gathers support from all prepared to stand for the advancement of *human manifest destiny*.

I advise against any semblance of 'token women' from a mix of gender on Apollo 18. Among honorable persons it is a *burden* to be gender-selected in the 21st century, which is as it should be. The crew must bear it together like any hardship. An all-female crew by Presidential fiat will seem odd, as it should. And it will be the type of action that would lead some to declare the President a scoundrel, before they think out all the angles. As it should be.

NASA will have no difficulty to find candidates, but they must be let off the hook.

Then there is the extent to which our NASA of the 21st century is even *capable* of 'clearing their desks' to accommodate some stated National Priority. It was formed under the unity and strict military supervision of Apollo -- but has divested into a *juggernaut* of special interests competing for funding. Generations have passed through NASA without any single clear-the-desk moment, and since the Space Race there has been no military objective beyond Earth orbit. Can they adapt?

~ CUE "THE PUNDITS DOTH PROTEST TOO MUCH, METHINKS"

In the current political environment... I'll have to admit Project Artemis sounds like *great fun*. The more people try to paint this as a bad thing -- due to the bizarre battle lines that have been drawn -- they'll begin to feel a growing compulsion to fall silent if they are smart. As they begin to witness their own daughters' genuine interest and zeal they will either fall silent, or be bad parents. The best case scenario is that we all shut up and get back into space.

What other national enterprise offers the chance to face off opposition who don't play nice by reminding them that they don't have a daughter ...or... they do have a daughter ... with equal impact? It's diabolical!

The contingent that injects politics into #MeToo will find itself unable to unget unbehind the idea, with possibly hilarious undertones. Men will get behind it because they're generally supportive of women. Other men because they are naturally fascinated by the adventures of women, especially when televised.

The extent that Project Artemis 'spices up' America's reentry into space, as compared with any of the missions presently proposed, remains to be seen, impossible to measure. Of course I am hoping it will be such a runaway success the country is seized by Apollo fever to an embarrassing extent. Just like old times.

But it can only happen by Presidential decree. A brave President who has the strength and self-assurance to carry it through, and knows you may have to break a few eggheads to make an omelet. The best thing to do is plant chickens.

~ CUE THE RACE WARS

Let it run its course with a silent incredulous stare. Upon announcement of a mission exclusive to women -- no matter their heritage -- merchant vultures of race will take a sudden interest in nit-picking the astronauts' races, then each others' races, then the races of random objects in the room, because that is what they do. Half of them will be men, those can be ignored. The other half women, ignored politely.

Of two things we may be sure: the fine women astronauts selected will surely have *races*; and every one of the races not represented in the group has *women*.

~ CUE THE CONGRESSIONAL SPACE BUDGET WARS

If I listed the Federal programs or policies I consider wasteful, dangerous or unconstitutional, I might be unmasked as neither Republican nor Democrat nor Liberal nor Conservative. Even Quantitative Easing has failed us, if the end should come before wealth is once again created through productivity. I'll sit this out.

~ REINVENTING AND RETOOLING

Perhaps Apollo was so difficult and expensive because we didn't let women help enough.

Could we proceed without retracing any of NASA's cautious baby-steps during the Apollo era? Of course not, but I am wary of vignettes that describe Apollo as a mad rush that could *never* occur again within a similar time frame ... as if we still used draftsmen and pencils, stone tools and had not just spent decades in orbit.

We examine how a 140 t to low Earth orbit (LEO) Block II configuration of the Space Launch System (SLS) can be used to perform a crewed Lunar landing in a single launch. We show that existing RSRMV solid rocket motors can be used to achieve Block II performance by using a core with six RS-25E engines and a large upper stage (LUS) with two J-2X engines. A cryogenic propulsion stage (CPS) with four RL-10C-2 engines is used to perform trans Lunar injection (TLI), Lunar orbit insertion (LOI) and 75% of powered descent to the Lunar surface. A Lunar module (LM) initially carrying two crew and 509 kg of cargo is used to perform the remaining 25% of Lunar descent. The LM is in two parts consisting of a crew and propulsion module (CPM) and non-propulsive landing and cargo module (LCM). The CPM returns the crew and 100 kg of samples to the waiting Orion in Lunar orbit for return to Earth.

~ Steven S. Pietrobon, Ph.D., *FLY ME TO THE MOON ON AN SLS BLOCK II* [2017]

~ paper presented to session 8-A5.4 of the International Astronautical Congress in Adelaide, Australia

Steven Pietrobon is an Australian who has worked with NASA in the field of space communications. He has actually begun to design in his spare time the next Moon landing 'Apollo' mission, on paper. His proposal leverages NASA's present capabilities, and those just around the corner, to this very specific objective. I fall short of being able to follow and evaluate this intricate masterpiece... which has gained him a small inner circle of admirers who have even contributed original art to dress it up. To illustrate the level of Apollo interest out there taken to such an extreme that every American should be jealous... I will include a copy.

Is this 'NASA fan fiction', this whitepaper that delves straight away into calculation and computer modeling of essential mission parameters and a broad outline of go/abort options? If so then what a genre it is! What a fine species we are! And what a future we might have, if we make it so.

Enough already with the technology and the funding! It's boring! We must get women to the Moon! Only misogynists will stand in our way.

And Mars buffs.

~ MARS, RIGHT? SURELY MARS!

Mars is trendy! Mars is hot!

Going to Mars first, fixating on Mars and deep space exploration right now, is a *trap*.

It may be our *undoing*.

~ PLANETARY DEFENSE IS 'SPACE JOB ONE'

Sometimes I feel like the *only true environmentalist on Earth*. While all the other 'fake' environmentalists are out counting whales, writing poems, earning degrees in eco-things, going hyperbolic over trace gasses that benefit plants, jousting at oil, gas and plastic, designing cool logos for T-shirts... and yes, pushing Mars over Moon for no good reason other than it has yet to be visited by people...

I am sitting *in the corner* struggling (in vain) to find ways to reach them. Since we 'decoded' the message written in the KT boundary, the technically advanced human race has had one single job... a weapons system that could launch on a moment's notice to destroy or divert the next dinosaur killer. Which would save the whole (fucking!) environment. Splitting the atom was a step in the right direction. Apollo was headed in the right direction. Even missile technology has contributed vital pieces of the puzzle. Let us begin.

Putting up another satellite to lovingly gaze at Earth... going to Mars for the hell of it... even sending out great science missions to the budgetary or time exclusion of delivering true Earth defense capability... is time squandered. A fool's game. The way I see it, the moment we learned we were under existential threat, as parents *the responsible thing to do* was divert the necessary resources to answer the threat. This should even have 'preempted' the Cold War. Our adversaries should be ashamed also.

There are many ways to answer a threatening object, most are fancifully impractical. In a rare departure for science fiction, disaster movies are dangerously dumb. Let's cast out the contrived scenarios that give us oodles of time or great movies. No leisurely catching it on this go-round to avoid us on the next. No deploying solar sails. No landing people or equipment, gently. No tiny pushes when time is short. No Delta-V budget to match course with an object that is -- by definition -- heading straight for us at several km/s, there are no cloverleafs in space. Slingshot maneuvers are cool but impossible if large planets are in the wrong places. First, we must ask any who *cannot stop* talking about such things to *leave the room*.

Let us also dispense with the idea of sending one or even a few *things* to rendezvous with the threat. An existential threat demands more assured response than a sink-or-swim Hollywood moment. The price of failure is death, and embarrassment. Nuclear bursts at incredible combined velocity are viable IF they can range accurately and trigger before the weapon is destroyed, a challenge we've never had to face on Earth. A succession of bursts, each timed to enter the crater of the last, look great on computer models. Nuclear bursts in space alongside an object might ablate its surface and give a *gentle* sideways push from recoil. Even shaped nuclear charges are possible (Casaba-Howitzer). But this is untried technology. Nukes are fun, but... how much assurance can we gain from any *few* things?

There needs to be something so simple, so cheap, so 'low tech', so certain, we can start building *now*.

~ OVERWHELMING KINETIC RESPONSE

One Earth defense strategy is not burdened with warhead concepts or frivolous accessories. It makes use of our Cold War and NASA expertise but contains no actual warhead. It is directly tied to Apollo and gaining a permanent foothold on the Moon.

To divert or destroy a threatening object with any assurance, you must do to it what it is trying to do to you, *first*. Kinetically impact it by sending an armada of smart heavy things to meet it *soonest* with as much *multiplicity, precision, combined mass and anger*, as possible. Each 'thing' is a rocket launched from a battery on the Moon, carrying a heavy mass-payload of simple lunar dust.

Each must operate alone, or swarm intelligently to avoid others or meet objectives such as targeting a part of the object (if that is even possible) or flying in formation to coordinate moment of contact.

But here's the key: there must be *hundreds, even thousands of them*... each loaded with ballast and ready to fly at a moment's notice, receive a mission en route. The armada must form waves, each salvo capable of re-assessing last-minute objectives without delay of communication with base... such as a 're-swarm' to target individual fragments of an object as it splits. We supply the technology, the Moon supplies the mass, a place to stand, and light gravity to launch a populous armada with least fuel. Every developed country must help build this. It must be standard and modular, and should be functional *soon*. *This is what humans must do to protect their cherished worlds.*

'Soon' has always been the only responsible way to deal with an existential threat. Even a successful interception of a dinosaur-killer involves a meteor shower and impacted fragments to Earth. But in place of extinction of most life, hopefully it would just be an exciting day. Earth defense armadas must launch from the Moon to ensure the *multiplicity* and *mass* to get the job done. We never had the luxury of sorting through ideas as years go by, and doing *nothing at all*. Pray that we have not lost the race already.

All we need do now is take the next Lunar step with a clear goal in mind. New Apollo and the other space programs around the world should immediately go 'heavy' with concerted effort to establish Moon bases and combined framework for supply and operations on the Moon, to build a kinetic missile battery.

If anyone suggests that such awesome destructive power should never be placed in the hands of men, staff it with women.

Apollo was America's chance to be *daring*. Earth Defense, Delivered, is our tribute to the living Earth as we accept the mantle as steward to Gaia. Even Scripture ordains this. Carl Sagan posed that as soon as the atom is split every species enters a stage of *nuclear adolescence*. People keep saying, once the nukes and other weapons are *all gone* that adolescence will be over. People are full of shit. The way past adolescence is not to forget history and unmake things, it is to focus on loftier goals and reshape our tools.

The day we fret about the future is the day we leave our childhood behind.

-Patrick Rothfuss, The Name of the Wind

NASA wants to send missions out to *study* Near Earth Objects as if... we might learn something useful. We might, but hasten to *target practice*. STANDARD DISCLAIMER: We might destroy an approaching alien starship on a direct approach vector that is cleverly disguised as a rock. Then again it might actually be a rock, hurled by aliens. That is how *I'd* make war. A rock it must be, until we see the whites of their eyes.

~ A WORD ON 'ASTEROID IMPACT PROBABILITY ABUSE'

Here is a question. Ask around. Have fun. "**What are the chances that a newly discovered KT SLATEWIPER (a Sudden Large Accretion To Earth Which Irresponsible Parents Enormously Regret) might arrive in two months, eleven days, ten hours, thirty-nine minutes and fifty seconds?**" For best effect, write it out on a slip of paper and quietly show it while glancing around.

Do you get a firm answer? A smile? A shrug? A citation? The name of a University professor? Some large or small number spiced with gently dismissive assurance? If you get a sudden look of concern, sharp intake of breath and they reply "Couldn't say. Why do you ask? Do you *know* something?" recruit that person on the spot. We need to assemble a large team of such people. Our lives may depend on it.

Failure to consider a *confirmed and inevitable existential threat* as a special case that is *beyond the useful application of statistics and probability* is a mental disorder. I suggest this so you may be better able to identify those afflicted, people you'd never suspect. This topic really flushes them out.

Another malady affecting discourse today is failure to differentiate between disaster scenarios *resulting from human action or preventable through human restraint*, which I refer to as 'tabloid threats' due to the highly dramatic, often corrupt and arbitrary methods used to describe them and assess risk... and confirmed dangers *beyond the present sphere of human influence*, the 'wake-up calls'. I'll not expound but to say the Cold War was pure tabloid, medicine (disease) a wake-up call answered.

The plain truth is even a more-statistically-likely (until it isn't) 'small' city-killer is unlikely to hit a city. Yet we like to build and live near the coast. Tsunamis from an ocean impact and distant sympathetic earthquakes could paralyze world economy with a global simultaneity never witnessed in modern times. Even if miraculously few lives were lost, fragile infrastructure would be devastated in our most populous areas, imposing New Orleans conditions along whole coastlines. Could anyone put a price tag on this that could compare to the cost of an Earth defense system?

Wake-up calls deserve more attention than tabloid noise.

To extend the sphere of human influence is the real goal.

If there is a parable for this, it is *The Grasshopper and the Ant*.

~ A WORLD UNITED AGAINST A COMMON ENEMY

It is time for a *global showdown* between two major personality types of our time: those who are prepared to act quickly and decisively to mitigate this existential risk, and those who will oppose on many fronts... and it will be a showdown, for the opposition will attempt to 'quantify' the existential threat to a level where it could be passed over for this and the next generation, as has already happened, or dismissed altogether. They will call this 'logic, statistics and science' though it is none of those.

It is a mental disorder.

Great oratory is called for, harsh language also.

People who think they have plenty of time find it easy to propose or oppose anything, and language is rich with rhetoric of delay. Deficits grow less than we had feared, progress is made on countless fronts, we are closer now than ever before, love is just around the corner. In our developed world there are *as many people able to survive by talking about things* as those *doing things*. To the modern civilized mind global cataclysm is safely ensconced in speculation, early history, sacred text and cinema. Liberal arts education focuses deeply on the 'tabloid disasters' of history, strictly human atrocities that we and our neighbors would never repeat. It's someone else's job to think about such things, even if *no one is*. Easy to assume we are in the middle-weave of some tapestry between a dim beginning and distant end.

Expect opposition to the idea that erstwhile enemies, even bitter enemies, should all come together to assemble a collective weapons platform that could -- through some mishap or menace -- send kinetic weapons down to places on Earth. A humorous cosmic irony, the ultimate Prisoner's Dilemma, that a whole species would knowingly seal its doom with its failure to trust one another as individuals.

There is NO way to debate this to any unified consensus in the end. Despite the greatest tenets of all world faiths... the human race is experiencing technical difficulties, please stand by. The language of *distrust and paranoia* has become far more subtle and intricate, more lucrative, more fun, than the language of *trust and action*.

It is my conviction then, that there can be no round table with talking sticks and common vote. One of the remaining superpowers must step forward to announce that it is committed to resolving this 'existential threat' for all of humanity... to begin immediately without debate. It shall be conducted transparently with assurance that others who come to agree such action is necessary, may join the effort.

That is where America comes in.

Apollo, showing that we could land on the Moon, was the *first* step.

Artemis, goddess of the hunt, is *next*. Let us hunt space rocks.

~ MARS CRAZIES AND THE ANGST-RIDDEN PATHOS OF OUR TIME

If I saw no urgent reason to return to the Moon I'd be all in for Mars. If I'd had more success to communicate *existential threat* to them, I'd feel more kindly to Mars buffs as a group.

I perceive a broad demographic which is young and tech-aware but has blind spots when the topic drifts to feasibility:urgency:cost:benefit. They fix on *dim* and *distant* Mars with the same tenacity as they fix on unreliable energy sources and the friendly ghost of nuclear fusion, and have been drawn into escapist science fiction where a handful of heroes are sent off to "live the dream", to leave the mother world bankrupt and undefended. Press on, towards building a technological utopian welfare state on Mars too distant to benefit Earth, its colonists marooned for life. The most tragic reality television show in *two* worlds.

I thought the reality TV show was my own joke until I learned it is actually an integral part of their funding.

When I was young the KT Layer was an unnoticed oddity of the landscape. Paleontology was host to a panoply of gradual extinction theories. *Only since the time of Apollo* evidence of catastrophe has mounted, and many recoiled at the thought that mass extinction and complete transformation of our world could occur in a *single afternoon*. As it became known as the KT Boundary, above which no dinosaur fossils are found, the *why* should have galvanized us to action. There would be no need to find the actual crater or stressed ejecta worldwide, but we found those also.

So *what is it with these Mars people*? Have luminaries Carl Sagan and Neil deGrasse Tyson not sufficiently described the dinosaurs' fate as possibly our own... or done so too complacently, too glibly? In Sagan's time impact extinction was still building consensus and he chose his words carefully. Yet since, frank discussion of this threat escapes the collective consciousness, remains *buried* in documentaries, footnotes, plenary symposiums and tabloid articles pushed by fear-mongers who blew their credibility. And Moon Hoax claims are pushed into older peoples' faces by *punks* as an easy way to 'F' with people. What a mess. Could we pause the whole world for just a moment?

In a cruel thought experiment I dispense with space rocks and present Mars enthusiasts with a simple choice. EITHER build a mission to (expensively) send people to land on Mars, plant a flag and return, then assemble people (not them personally) and lots of equipment to travel to Mars to (perhaps) slowly die on television. ...OR... send an unmanned mission to deploy satellites in Mars orbit and land two dozen next generation 'Curiosity' rovers... and give control over to the Internet, so enthusiasts can virtually explore Mars from their home computer.

The thought experiment ends with Mars buffs choosing the rovers because their personal desire to play with them outweighs, even displaces, any selfless drive to advance human space colonization, however morbid. What a relief. NASA needs some budget to keep them *entertained* is all.

~ LUNAR LOONIES

My Apollo-era mind sees the Moon as Tomorrow.
The same Tomorrow we were promised yesterday.

Colonies on the Moon in proximity to Earth represent the best place within reach to grow on, spiritually and commercially. Burrowing into the Moon under domed craters shielded from radiation and micrometeorites by double-domes containing clear, crystalline *water*, these are the space utopias we may achieve in our time, with Thorium energy to sustain life and operate massive grow-lights during the lunar night. There is Helium-3 fusion and other ways to commercialize besides tourism, but occupying the Moon should represent humanity's gateway to Mars, to Galaxia and above all... from asteroids, *assured survival*.

~ MY OWN APOLLO 18 MISSION OBJECTIVE

Having experienced the footprint on the Moon and Apollo missions as a small child, I rue that my children have not had such a moment, and wish to see the United States recapture the spirit. Project Artemis, a sign that we are not just capable of great feats, also humility and self-reflection. I want my *grandchildren* and their children to visit domed craters on the Moon, strap on wings among giant trees, and take flight under human power. And yes, we should go on to Mars when we have obtained the *assurance of continued survival* that a kinetic Moon battery would bring. Space is the only place we have left to *go*.

To nay-sayers, Mars delayers, robot-pushers and navel-gazers why not just say,

"Because it's their turn."

"It's the next step."

*Lives of great men all remind us
We can make our lives sublime,
And, departing, leave behind us
Footprints on the sands of time.*
~ Henry Wadsworth Longfellow

~ SPECIAL PROJECT: FOOTPRINTS (ON THE SANDS OF TIME)

What if... the crew carries a set of their actual bare foot prints as 3D-printed plastic forms, to impress onto the Lunar surface sufficiently distant from the lander, to remain undisturbed for aeons? Hand prints also. The novelty of this will eclipse any perceived kitsch factor. The person in orbit should also be represented, with special attention to photograph every print. Training to commence at sundown on the beach, followed by dinner.

While the Earthrise photo depicts Apollo 8, a boot print the icon of Apollo 11 ... photographs of beautiful human shapes of hands and feet in the Lunar dust will come to symbolize Apollo 18. Womens' no less. A footnote of herstory.

~ ON THE INCLUDED 'MOON' VIDEO DVD

Amy Shira Teitel is a YouTube space enthusiast who has produced some interesting and insightful material on the Apollo era. She strives to present factual history on her 'Vintage Space' channel but also confines personal viewpoints to a separate 'Amy Shira Teitel' channel, a rare skill in today's world. I've included two of her clips that relate to Project Atremis.

Amy is worth following because she embodies some of the best in Apollo era reporting today with unbridled enthusiasm and (as female) a thoroughly professional lack of judgment on the maleness of Apollo.

1. Amy Shira Teitel: Why Trump Shouldn't Send NASA Back to the Moon

~ Feb 25, 2017 Youtube posting on her personal 'Amy Shira Teitel' channel

Responding to the proposal of an SLS/Orion orbit around the Moon before the end of 2018, she gives some interesting Apollo background but is taking exception to the timeline, NASA's current state of readiness... and not least, that a simple Moon orbit would not break new ground. (Note: she mistakenly says that NASA's budget in the 60s was 4% of GDP, it was actually 4% of the budget as she pointed out in comments).

This clip is notable in that Amy recognizes Trump as seeking a presidential "Apollo 8 moment" in a non-disparaging way. It is actually a natural and rational way to describe it. I too desire such a moment. Rather than leaving the phrase to others as if it were some accusation of conceit, Trump should seize on it, co-opt it even. Our nation deserves its grand 'Apollo 11 moments' which have been lacking of late. And if Trump would with appropriate fanfare, refine his Kennedyesque directive to become "landing women on the Moon and returning them safely to Earth, before the end of my second term in office" ... that's two birds with one stone, within a more credible timeline.

2. Amy Shira Teitel: The Wrong Stuff: NASA, Politics and the Mercury 13

~ Jun 2, 2017 TEDx talk at the University of Rochester

An account of the women who trained for NASA Mercury missions scoring as well as the men, and their outspoken advocate before Congress as their program was shut down, Geraldyn M. Cobb. *"She wanted to do [first] for the United States what Valentina Tereshkova [later] did for the Soviet Union, and nobody would listen to her. She wound up leaving the US and flying as a missionary in South America for the rest of the decade. So Cobb's story is not necessarily the best one, because this woman gave her life to flying. She gave up flying to try to fly in space, and when that didn't work, she left the country. But the most incredible part of her story I think is the fact that she fought as hard as she did for something that she believed in, even though she didn't have a guarantee."*

In this talk Amy drops the savvy gem, "Moon is greater than Woman" as she describes NASA's position before Congress that the goal of training women astronauts was (somehow) mutually exclusive with meeting their tight decadal deadline.

I'll go farther to say there had to be a strong undercurrent of aversion to the idea also, much like the present gainsaying of the current Administration that reaches below politics into some desperate emotional wilderness, a realm where revulsion and petty angst rule. History (and Amy) forgive NASA for this thinly veiled 'Cold War excuse' culminating in the Apollo 11 Moon landing.

But I take a very stern view to subsequent Apollo 12-17 missions. Considering that America's Female Finest had weighed in almost a decade before, it is a lingering national embarrassment none were in the pipeline. Not one woman had set foot upon the Moon as the era ended. Of course having been sponsored by a program that had been cancelled, there could not be since there were no candidates in training or rotation.

So to those lame excuses you may add circular reasoning.

It is high time for "Woman to trump Moon".

3. Discovery: The Last Day of the Dinosaurs [2010]

If you visit the Internet Movie data base IMDB.COM today you will find a stub for this without a single user-contributed review. It even has its own Wikipedia page that is a 'stub' of sorts. While there is an excellent summary of the script and the science behind it, an important Wikipedia section is missing: references as to how the documentary has influenced and been cited in popular culture.

None, because it hasn't. Chances are you've never heard it being discussed. I would like to change that.

This fine documentary hour exists in a strange *cultural limbo*. With content parents might deem too graphic for young viewers; too 'analog' for teenagers captivated by computers 'n apps and modern STEM; too animaly for human history buffs; perhaps too 'Disney' for adults who might shrug it off as some dinosaur soap opera. How often have you heard how 'fortunate' it was the dinosaurs perished to open up a niche? Whither without God's Plan, by happenstance or uncreation, most documentaries these days *try to avoid upsetting people*. This one cannot help it. For Central and North Americans the KT impact is riveting... but as we soon learn, *it doesn't matter where on Earth you are*.

You might imagine some folks at the International Space Station looking down upon Earth -- that post-impact Earth so vividly depicted here, a horrifying opaque orange sphere molten fragments and poisoned atmosphere. Knowing that theirs is the *last mission*, and that there will be *nothing* and *no one* to come home to.

Might they wonder... is there some thing we could have done differently?

4. PBS NOVA: Decoding the KT Boundary

Covers past and present investigation of the KT Boundary and its implications for humanity. Imagine that a serial killer on the loose, and you are searching for clues. If we do not solve the mystery and go after the killer, the human race -- the whole ridiculous *circus* of it all -- may be its next victim. Great science can give you a warm fuzzy feeling. Ensuring survival of the whole Earth for ourselves and future generations would feel even *better*.

5. Thorium Remix 2011

~ assembled by Gordon McDowell, featuring Kirk Sorensen of FliBe Energy and others

After all these years, *still* one of the finest technology overviews ever produced. *Still* a great crash course in nuclear energy. *Still* the best way for the human race to move forward to a grand surplus of grid electricity and process heat. Nuclear energy and specifically LFTR is *still* the only way to inoculate us from the orchestrated supply-side volatility of natural gas, and prevent an inevitable 'sudden death' of the Northeastern grid as *some completely foreseeable event* plays out and interrupts (or overbooks) critical components of the JITF (just-in-time, fools) pipeline network.

Since CDs are cheap and unheard ideas are expensive, I'll include all my letters (including this) on a disc in PDF, including the most recent on Energy, transmitted to Energy Secretary Perry, on the hidden peril of natural gas.

And an old essay of mine, *Paced by the Animals*, to serve as a more relaxing Epilogue to this letter.

I am deeply saddened by the skewering of the proposed 90 day rule that would have benefited coal and nuclear, encouraging a stockpile of fuel storage, which is a *damned fine move* to ensure the lights and electric heat stay on. There are some dangerous fools about. Please keep gnawing at it.

Preparing for darkness (and a mini ice age) while reaching for the light.

Thanks kindly for listening,

XXXX

Epilogue: Paced by the Animals

Before the pathological evil of what we know as the industrial war machine, with broadcast technologies and deployment tactics that could harness fear and loathing to politics everywhere at once--- and the tireless drudges who worship them came to the fore---

We were becoming increasingly cyclical, distracted by moment, swaying in tighter rhythms while not dancing -- a bad sign. Hypnotized by the leafspring, the mainspring, the ratchet, the pendulum and most obnoxious of all, an hour-bell that means something besides nothing.

Between brutal wars -- merely pathological, in a cute sort of way. The animals kept us sane.

Despite ages of civilized existence -- it has scarcely been **one hundred years** since our clocks and calendars, biological and practical, were last *paced by animals*. And what a time it has been.

Rome built the roads; but it was always horses and oxen that set the pace. Oxen and people, measured seasons of growing in the fields. Even on the ocean do we find animal companions, for in the days when sails took us to places unknown, animals were aboard to ensure survival. But the wind itself is like an ox, with moods that paced the journey.

History has always moved in waves, legions of soldiers traveling light and fast as wind, settlers burdened with goods at a snail's or oxen-pace. On a smart strong horse riders could doze and daydream, the beast's eyes as fixed on the horizon as the rider. In the far north dogs, rivers and caribou set the pace; in Summer mosquitoes kept everyone on the run.

Was a time we'd foretell the seasons by the birds as they got ready to travel, there were places for them to roost. Migrating birds and the moon and the stars to guide them were featured in theaters of sky and morning and evening and darkest night.

People cast tiny flickering shadows on land that went out with sleep -- not the lidless throbbing glimmer of busy continents today.

And news flowed like the tides -- news from over the ocean, of country and world gathering in eddies of pulp presented, like sermons, in their own time and place of reading. Local news and affairs churned with comfortable babbling regularity: ripples of gossip, stories heard in tavern and meeting-house and church. Rumor from afar came through with strangers and gathered rapt attention for telling and re-telling. Church it was that harnessed the calendar at first -- but it took a whole week for the tides of morality to flow round again -- plenty of time left for fun.

Where days full of task might stretch a bit here and there played themselves out, church bells gave us the first hint of regimentation to time. A manageable affair, for even old rural school-house days could hold more leisure within the hours, and there was more mixing between the ages during the process of learning. Apprenticeships. Though even in the age-segregated electric-bell'd warrens of today a good teacher can still open vistas; but like all modern animals even teachers are challenged by pace and environment. They're only human.

Even our busiest cities were townish -- wide avenues for horses, slow moving newspapers and the ever-present lure to market-place, wharf and concert hall tugged at us, kept us moving *between meetings*.

Those on long journeys tended to be out in the open. They set sights on destination more so than the calendar; getting there was the thing even if the journey was not. And long many-people journeys were actually moving cities -- where one or two people drift into dream-time, whole families and groups illuminated the trail with their own culture and hobby. We sang along the rivers, played music in time with horses' hooves. Children sought adventure on the fringes of camp.

Weather was the ocean we lived in, not the comforting or annoying visitor it is today. If you spot people-dots in a model of society you'll find us traveling more distance but *moving around less than ever before*. Everything is piped in, even things that shouldn't have been.

Farms have become crop-centric, as electrified as cities and busy as factories; where farmers once were products of their own lifestyle they have become wage-slaves to the mortgage, the production and accounting cycle.

Families spread out further into the world, their young members seeking *destination* -- not a smaller mere comfortable *distance*, as once had been in growing human society. A day's ride long enough for most. Today many families gather again only to plant their eldest -- who spend their final days alone, waiting for gossip from afar -- where once they would have been in the thick of things. Stories go unremembered, stories that were too often untold... or told to no-one in growing darkness and unwelcome solitude.

What animals we may carry with us now are small, captive. They roam empty houses while their masters are out stalking money and becoming smart enough to survive -- stalking and hunting, knocking over objects they should not have, feeling guilt that shouldn't be. Dimly recalling a time when knocking things over was the way to get along in the world.

The dogs are especially restless -- for it was they who joined us once, bringing sudden joyful profit to the hunt. They guarded our children from predators while we slept, and enabled us to sleep, to relax, and dream -- and as we dreamt those quiet dreams made possible by the vigilance of our canine friends -- we would dream of waking -- and when we did wake the morning dew, like the daily paper on later doorsteps, brought ideas that helped shape today different from yesterday.

Subject to the same whims of time and schedule as we. Is it any wonder our pets are neurotic as well? They remember what we have forgotten.

And our latest companion, the personal computer, most neurotic and spasmodic of all.

We must use the Internet -- to find the slow tides of thought, laughter and fable we wish to use to construct our worlds, and spend equal time out in the most desperate emotional wildernesses of our time, to tame them to our liking.

And we must build. We must yearn to live in space -- *because it is the only place we have left to go*.

Without killing everybody else, as the small-minded will get around to doing -- just as soon as they think themselves into a tiny corner, the last little corner.

And some of the greatest, most idyllic places -- greatest challenges, noblest efforts, greenest pastures and the happiest jolity-farms to which our race could ever aspire to build -- must, by dire necessity and by evolutionary manifest destiny -- be **in space**.

If we let the small-minded do our thinking for us there will be no bedtime story -- just to bed, not to rise. Pursuit of happiness is the thing. Without the running-in-circles part.

Let our planets, and our colonies, and our galaxies do the spinning for us.

And you my friend --- you would look especially good in space.